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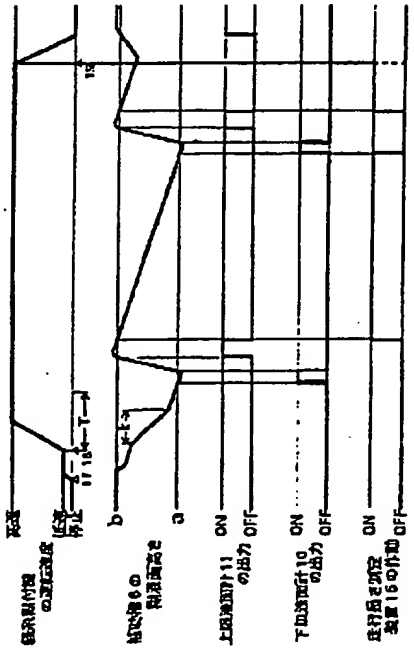
(54)【発明の名称】　経糸糊付機における糊付着率の測定方法

(57)【要約】
【目的】　過渡状態又は誤動作による大きな誤差を有する測定値を表示しない。
【構成】　補助槽６の糊液面が測定区域の始点ｂから終点ａに移動する間に経糸が走行する長さを測定し、その長さと、その間に補助槽から減少する糊液量に基づいて糊付着率を計算する。経糸糊付機が所定の運転速度になって補助槽６の糊液面の移動速度が過渡状態を経過した後で、経糸糊付機が所定の運転速度から減速し始める前に、補助槽６の糊液面が測定区域の始点ｂから終点ａに移動するときにのみ糊付着率の測定値を出力する。また、糊付着率の測定値が糊液濃度の半分より大きくて２倍より小さいときにのみその測定値を出力する。



【特許請求の範囲】
【請求項１】　主槽の糊液を経糸に付着し、主槽の糊液が経糸に付着して持ち去られるに従って補助槽の糊液面が下降し、補助槽の糊液面が所定の下限位置に下降してから所定の上限位置に上昇するまで補助槽に糊液を補給する経糸糊付機において、
補助槽の糊液面が所定の上限位置に達した以後で所定の下限位置に達する以前の範囲内に測定区域を設定し、補助槽の糊液面が測定区域の始点から終点に移動する間に補助槽から減少する糊液量を予め求め、
補助槽の糊液面が測定区域の始点から終点に移動する間に経糸が走行する長さを測定し、経糸の走行長さの測定値と上記の予め求めた糊液量に基づいて経糸の糊付着率を計算する糊付着率の測定方法であって、
経糸糊付機が所定の運転速度になって補助槽の糊液面の移動速度が過渡状態を経過した後で、経糸糊付機が所定の運転速度から減速し始める前に、補助槽の糊液面が測定区域の始点から終点に移動するときにのみ経糸の糊付着率の測定値を出力することを特徴とする糊付着率の測定方法。
【請求項２】　主槽の糊液を経糸に付着し、主槽の糊液が経糸に付着して持ち去られるに従って補助槽の糊液面が下降し、補助槽の糊液面が所定の下限位置に下降してから所定の上限位置に上昇するまで補助槽に糊液を補給する経糸糊付機において、
補助槽の糊液面が所定の上限位置に達した以後で所定の下限位置に達する以前の範囲内に測定区域を設定し、補助槽の糊液面が測定区域の始点から終点に移動する間に補助槽から減少する糊液量を予め求め、
補助槽の糊液面が測定区域の始点から終点に移動する間に経糸が走行する長さを測定し、経糸の走行長さの測定値と上記の予め求めた糊液量に基づいて経糸の糊付着率を計算する糊付着率の測定方法であって、
経糸の糊付着率の測定値が糊液濃度の半分より大きくて２倍より小さいときにのみその測定値を出力することを特徴とする糊付着率の測定方法。
【発明の詳細な説明】
【０００１】
【産業上の利用分野】本発明は、経糸糊付機において経糸の糊付着率を測定する方法に関する。
【０００２】
【従来の技術】経糸糊付機は、糊液の主槽に糊付けローラと糊絞りローラを設け、主槽の糊液を経糸に付着する構成にし、主槽に形成した越流部から流出する糊液が流入する補助槽を設け、補助槽の糊液を主槽に供給するポンプ付の供給通路を設け、主槽の糊液が経糸に付着して持ち去られるに従って、補助槽の糊液面が下降する構成にしている。
【０００３】また、補助槽の糊液面が所定の下限位置に下降すると出力する下限液面計と、補助槽の糊液面が所定の上限位置に上昇すると出力する上限液面計を設け、下限液面計が出力してから上限液面計が出力するまで補助槽に糊液を補給する構成にしている。
【０００４】経糸の糊付着率計は、補助槽に糊液が補給される毎に、上限液面計が出力してから下限液面計が出力するまでに経糸が走行した長さを測定し、予め求めた補助槽の上限位置と下限位置間の糊液量と経糸の走行長さの測定値に基づいて経糸の糊付着率を計算して出力する。
【０００５】
【発明が解決しようとする課題】ところが、経糸糊付機は、運転を開始すると、糊付けローラと糊絞りローラが回転し始め、主槽の糊液に半没した糊付けローラと糊絞りローラの各周面に糊液が巻き上げられて付着し、主槽の糊液が糊付けローラと糊絞りローラに持ち去られて補助槽の糊液面が急激に下降する。また、経糸糊付機の運転を停止すると、糊付けローラと糊絞りローラの各回転速度が減速し始め、糊付けローラと糊絞りローラの各周面に巻き上げられていた糊液が主槽に流入して補助槽の糊液面が急激に上昇する。従って、経糸糊付機の運転開始直後と運転停止時の過渡状態のときに測定した経糸の糊付着率は、大きな誤差を有する。
【０００６】また、経糸糊付機の運転中に補助槽の糊液面に波や泡が発生する等して上限液面計や下限液面計が不意に誤動作することがある。このような誤動作時に測定した経糸の糊付着率は、大きな誤差を有する。
【０００７】大きな誤差を有する経糸の糊付着率の測定値即ち所定の値から大きくずれた測定値が表示されると、その測定値が大きな誤差を有することを知らない運転者は、経糸の糊付着率を所定の値にしようとして、経糸糊付機を調整する。その結果、経糸の実際の糊付着率が所定の値から大きくずれることになる。
【０００８】本発明の目的は、上記のような従来の課題を解決することである。
【０００９】
【課題を解決するための手段】本発明は、主槽の糊液を経糸に付着し、主槽の糊液が経糸に付着して持ち去られるに従って補助槽の糊液面が下降し、補助槽の糊液面が所定の下限位置に下降してから所定の上限位置に上昇するまで補助槽に糊液を補給する経糸糊付機において、補助槽の糊液面が所定の上限位置に達した以後で所定の下限位置に達する以前の範囲内に測定区域を設定し、補助槽の糊液面が測定区域の始点から終点に移動する間に補助槽から減少する糊液量を予め求め、補助槽の糊液面が測定区域の始点から終点に移動する間に経糸が走行する長さを測定し、経糸の走行長さの測定値と上記の予め求めた糊液量に基づいて経糸の糊付着率を計算する糊付着率の測定方法であって、経糸糊付機が所定の運転速度になって補助槽の糊液面の移動速度が過渡状態を経過した後で、経糸糊付機が所定の運転速度から減速し始める前

に、補助槽の糊液面が測定区域の始点から終点に移動するときにのみ経糸の糊付着率の測定値を出力することを特徴とする糊付着率の測定方法である。

【００１０】また、上記の経糸糊付機において、補助槽の糊液面が所定の上限位置に達した以後で所定の下限位置に達する以前の範囲内に測定区域を設定し、補助槽の糊液面が測定区域の始点から終点に移動する間に補助槽から減少する糊液量を予め求め、補助槽の糊液面が測定区域の始点から終点に移動する間に経糸が走行する長さを測定し、経糸の走行長さの測定値と上記の予め求めた糊液量に基づいて経糸の糊付着率を計算する糊付着率の測定方法であって、経糸の糊付着率の測定値が糊液濃度の半分より大きくて２倍より小さいときにのみその測定値を出力することを特徴とする糊付着率の測定方法である。

【００１１】

【作用】本発明においては、経糸糊付機が所定の運転速度になって補助槽の糊液面の移動速度が過渡状態を経過した後でなければ、経糸の糊付着率の測定値が出力されない。経糸糊付機が所定の運転速度から減速し始める前でなければ、経糸の糊付着率の測定値が出力されない。

【００１２】また、経糸の糊付着率の測定値が糊液濃度の半分より大きくて２倍より小さくなければ、その測定値が出力されない。

【００１３】経糸の糊付着率の定義式

糊付着率＝糊重量／糸重量

の右辺に「糊液重量」を掛けて「糊液重量」で割ると、

糊付着率＝（糊液重量／糸重量）×（糊重量／糊液重量）

となる。糊液重量／糸重量は絞り率であり、糊重量／糊液重量は糊濃度であるので、上記の式は、

糊付着率＝絞り率×糊濃度

となる。

【００１４】糊濃度は、通常、経糸の糊付け中ほとんど変化しない。絞り率は、一般の経糸糊付機では、０．７～１．３の範囲内である。従って、経糸の糊付着率は、一般に、糊濃度の０．７～１．３倍の範囲内である。経糸の糊付着率の測定値が糊液濃度の半分以下であるときと、糊液濃度の２倍以上であるときは、その測定値は、誤動作による大きな誤差を有している。

【００１５】

【発明の効果】本発明においては、経糸糊付機の運転開始直後と運転停止時の過渡状態のときには、経糸の糊付着率の測定値が出力されないので、過渡状態による大きな誤差を有する測定値が表示されない。

【００１６】また、経糸の糊付着率の測定値が糊液濃度の半分以下であるときと、糊液濃度の２倍以上であるときは、経糸の糊付着率の測定値が出力されないので、誤動作による大きな誤差を有する測定値が表示されない。

【００１７】従って、大きな誤差を有する測定値が表示されないので、運転者が誤って経糸糊付機を調整することが防止される。

【００１８】

【実施例】本例の糊付着率の測定方法を実施する経糸糊付機は、ビームクリール部、糊付部、乾燥部、分割部と巻取部を順次配列して構成している。

【００１９】糊付部は、図１に示すように、糊液の主槽１を設け、主槽１に、案内ローラ２と、糊液ｓに半没する糊付けローラ３、及び、糊液ｓに半没するローラとその上側位置のローラを並列した絞りローラ４を設け、経糸ｙが、案内ローラ２を経て主槽１の糊付けローラ３下側位置の糊液ｓを通過し、絞りローラ４の上下のローラ間を通過して、糊付けされる構成にしている。

【００２０】主槽１には、図１に示すように、その糊液面の高さを一定に保持する越流部５を設け、主槽１の越流部５の下側位置に糊液の補助槽６を設け、主槽１の越流部５から流出する糊液ｓを補助槽６に受け入れる通路７を設け、補助槽６の糊液ｓを主槽１に供給するポンプ８付の供給通路９を設け、主槽１の糊液ｓが経糸ｙに付着して持ち去られるに従って補助槽６の糊液面が下降する構成にしている。

【００２１】補助槽６には、図１に示すように、その糊液面が所定の下限位置ａに下降すると出力する下限液面計１０と、所定の上限位置ｂに上昇すると出力する上限液面計１１を設けている。

【００２２】補助槽６の上方位置には、図１に示すように、糊液ｓの貯蔵槽１２を設け、貯蔵槽１２の糊液ｓを補助槽６に補給する開閉弁１３付きの補給通路１４を設けている。

【００２３】主槽１の案内ローラ２には、図１に示すように、経糸ｙの走行長さを測定する走行長さ測定装置１５を設けている。

【００２４】また、図１に示すように、中央処理装置１６を設けている。中央処理装置１６の入力端には、下限液面計１０と上限液面計１１及び走行長さ測定装置１５をそれぞれ接続し、経糸糊付機の低速運転スイッチ１７、高速運転スイッチ１８と運転停止スイッチ１９をそれぞれ接続し、入力装置２０を接続している。中央処理装置１６の出力端には、補給通路１４の開閉弁１３を接続し、表示装置２１を接続している。

【００２５】下限液面計１０が出力してから上限液面計１１が出力するまでの間、補給通路１４の開閉弁１３が開放し、貯蔵槽１２の糊液ｓが補助槽６に補給される。

【００２６】詳述すると、図２に示すように、補助槽６の糊液面が下限位置ａに下降して下限液面計１０が出力する毎に、補給通路１４の開閉弁１３が開放し、補給通路１４の開閉弁１３上流側部分に滞留していた糊液ｓが補給通路１４の開閉弁１３下流側部分を通過して補助槽６に流入し始めた後に、補助槽６の糊液面が下降を停止して上昇を開始する。

【００２７】また、図２に示すように、補助槽６の糊液面が上限位置ｂに上昇して上限液面計１１が出力する毎に、補給通路１４の開閉弁１３が閉鎖し、補給通路１４の開閉弁１３下流側部分を通過中の糊液ｓが補助槽６に流入して、補助槽６の糊液面が上限位置ｂを越えて上昇し、その後、補給通路１４の開閉弁１３下流側部分の糊液ｓが補助槽６に流入する量が経糸ｙに付着して持ち去られる糊液ｓの量より少なくなると、補助槽６の糊液面が下降し始め、補助槽６の下降する糊液面が上限位置ｂを通過すると、上限液面計１１が出力しなくなる。

【００２８】本例の糊付着率の測定方法においては、図２に示すように、補助槽６の下降する糊液面が上限位置ｂを通過して上限液面計１１が出力しなくなる毎に、走行長さ測定装置１５が測定を開始し、補助槽６の糊液面が下限位置ａに下降して下限液面計１０が出力する毎に、走行長さ測定装置１５が測定を終了する。

【００２９】即ち、補助槽６の糊液面が下降する途中における上限位置ｂと下限位置ａの範囲を経糸ｙの糊付着率の測定区域に設定している。補助槽６の糊液面が上限位置ｂから下限位置ａに下降する間に補助槽６から減少する糊液量は、予め求め、入力装置２０から中央処理装置１６に入力している。

【００３０】下限液面計１０が出力する毎に、中央処理装置１６において、走行長さ測定装置１５が測定した経糸ｙの走行長さと、入力装置２０から予め入力した糊液量等に基づいて経糸ｙの糊付着率を計算し、その糊付着率を表示装置２１に出力して表示する。

【００３１】本例の糊付着率の測定方法を実施する経糸糊付機の運転を開始する場合、測定開始時間Ｔを入力装置２０から中央処理装置１６中の計時装置に入力した後、低速運転スイッチ１７を作動し、その後、高速運転スイッチ１８を作動する。

【００３２】すると、中央処理装置１６中の計時装置が作動する一方、糊付けローラ３と糊絞りローラ４が回転し始め、主槽１の糊液ｓに半没した糊付けローラ３と糊絞りローラ４の各周面に糊液ｓが巻き上げられて付着し、図２に示すように、補助槽６の糊液面が一定の期間ｋ急激に下降する。経糸糊付機の運転速度が所定の高速運転速度に達して補助槽６の糊液面の移動速度が過渡状態ｋを経過した後に、測定開始時間Ｔが経過して中央処理装置１６中の計時装置が出力する。

【００３３】中央処理装置１６中の計時装置が出力した後に、補助槽６の下降する糊液面が測定区域の始点ｂから終点ａを通過すると、走行長さ測定装置１５が作動し、経糸ｙの糊付着率が測定されて表示装置２１に表示される。中央処理装置１６中の計時装置が出力する前には、糊付着率は、測定されず、表示されない。

【００３４】経糸糊付機の高速運転を停止する又は低速運転にする場合、運転停止スイッチ１９又は低速運転スイッチ１７を作動する。

【００３５】すると、糊付けローラ３と糊絞りローラ４の各回転速度が減速し始め、各ローラ３，４の周面に巻き上げられていた糊液ｓが主槽１に流入して補助槽６の糊液面が急激に上昇するが、経糸糊付機の高速運転中に運転停止スイッチ１９又は低速運転スイッチ１７が作動すると、その後、糊付着率は、測定されず、表示されない。運転停止スイッチ１９又は低速運転スイッチ１７が作動したときに、走行長さ測定装置１５が作動中である場合は、走行長さ測定装置１５は、作動を停止し、それまでに測定した走行長さを取り消す。

【００３６】また、経糸糊付機の高速運転中、中央処理装置１６において、経糸ｙの糊付着率が計算される毎に、その計算された測定値は、入力装置２０から予め入力した糊液濃度と比較され、糊液濃度の半分より大きくて２倍より小さいときに、表示装置２１に表示される。糊付着率の測定値は、糊液濃度の半分以下であるとき、又は、糊液濃度の２倍以上であるときには、表示装置２１に表示されない。

【００３７】本例においては、経糸糊付機の高速運転開始直後と高速運転停止時の過渡状態のときには、経糸の糊付着率が測定されず、過渡状態による大きな誤差を有する測定値が表示されない。

【００３８】また、、経糸の糊付着率の測定値が糊液濃度の半分以下であるときと、糊液濃度の２倍以上であるときは、経糸の糊付着率の測定値が出力されず、誤動作による大きな誤差を有する測定値が表示されない。

【図面の簡単な説明】

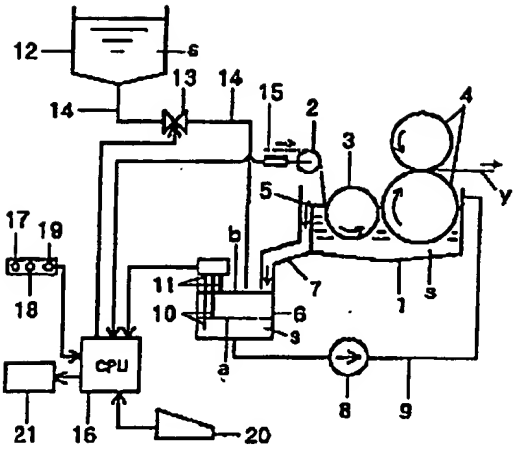
【図１】本発明の実施例の糊付着率の測定方法を実施する経糸糊付機の糊付部の概略側面図である。

【図２】同例の糊付着率の測定方法における経糸糊付機の運転速度、補助槽の糊液面高さ、上限液面計の出力、下限液面計の出力と、走行長さ測定装置の作動の関連と経時変化を示す線図である。

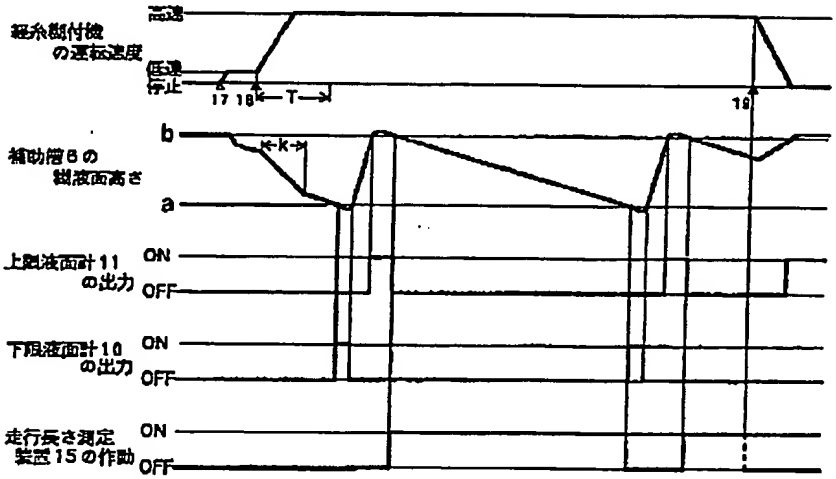
【符号の説明】

１　主槽	６　補助槽
１５　走行長さ測定装置	１６　中央処理装置
ａ　下限位置，測定区域の終点	
ｂ　上限位置，測定区域の始点	
ｓ　糊液	ｙ　経糸

【図1】


12
6
13
14
14
15
2
4
3
5
y
17
19
b
11
7
1
s
18
10
6
9
CPU
a
8
9
21
16
20

【図2】


編糸部付機の運転速度
高速
低速
停止
17 18
T
19
補助筒6の糸液面高さ
b
k
a
上限液面計11の出力
ON
OFF
下限液面計10の出力
ON
OFF
走行長さ測定装置15の作動
ON
OFF

[redacted]

JP-A-5-140859

[Title of the Invention] Method for Measuring Sizing Agent Adhesion Rate in Yarn Sizing Apparatus

[Abstract]

[Object] Not to display a measurement value having a non-negligible error resulted from an excessive state or malfunction.

[Structure] Yarn measurement is performed to see the length of a yarn conveyed while the surface of a sizing agent in an auxiliary sink 6 moves from a start point *b* to an end point *a* of a measurement zone. Based on the resulting length and an amount of the sizing agent in the auxiliary sink reduced in the same time period, the adhesion rate is calculated. The measurement value of the adhesion rate is output only when the surface of the sizing agent in the auxiliary sink 6 moves from the start point *b* to the end point *a* in the measurement zone. The output timing is after a yarn sizing apparatus reaches a predetermined operation speed, after a moving speed of the surface of the sizing agent in the auxiliary sink 6 is not in an excessive state any more, and before the yarn sizing apparatus starts showing speed reduction from the predetermined operation speed. Further, only when the measurement value of the adhesion rate is larger than a half of a concentration of the sizing agent but smaller than a value twice the concentration, the measurement

value is output.

[Claims]

[Claim 1] A method for measuring a sizing agent adhesion rate of a yarn in a yarn sizing apparatus in which a sizing agent in a main sink adheres to a yarn, and a surface of a sizing agent in an auxiliary sink falls as the sizing agent in the main sink adheres to the yarn and becomes less in amount, and in a time period after the surface of the sizing agent in the auxiliary sink falls down to a predetermined lower limit position and before rises up to a predetermined upper limit position, the auxiliary sink is supplied with the sizing agent,

a measurement zone is set between the predetermined upper limit position and the predetermined lower limit position for the surface of the sizing agent in the auxiliary sink, and an amount of the sizing agent in the auxiliary sink reduced while the surface of the sizing agent in the auxiliary sink moves from a start point to an end point in the measurement zone is previously calculated, and

a length of the yarn conveyed in a time period while the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone is measured, and based on the measurement value of the yarn length and the previously calculated amount of the sizing agent, the adhesion rate of the yarn is calculated, wherein

after the yarn sizing apparatus reaches a predetermined operation speed, after a moving speed of the surface of the sizing agent in the auxiliary sink is not in an excessive state any more, and before the yarn sizing apparatus starts showing speed reduction from the predetermined operation speed, a measurement value of the adhesion rate of he yarn is output only when the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone.

[Claim 2] A method for measuring a sizing agent adhesion rate of a yarn in a yarn sizing apparatus in which a sizing agent in a main sink adheres to a yarn, and a surface of a sizing agent in an auxiliary sink falls as the sizing agent in the main sink adheres to the yarn and becomes less in amount, and in a time period after the surface of the sizing agent in the auxiliary sink falls down to a predetermined lower limit position and before rises up to a predetermined upper limit position, the auxiliary sink is supplied with the sizing agent,

a measurement zone is set between the predetermined upper limit position and the predetermined lower limit position for the surface of the sizing agent in the auxiliary sink, and an amount of the sizing agent in the auxiliary sink reduced while the surface of the sizing agent in the auxiliary sink moves from a start point to an end point in the measurement zone is previously calculated, and

a length of the yarn conveyed in a time period while the

surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone is measured, and based on the measurement value of the yarn length and the previously calculated amount of the sizing agent, the adhesion rate of the yarn is calculated, wherein

only when a measurement value of the adhesion rate of the yarn is larger than a half of a concentration of the sizing agent but smaller than a value twice the concentration, the measurement value is output.

[Detailed Description of the Invention]

[0001]

[Industrial Field of Application] The present invention relates to a method for measuring, in an apparatus for sizing a yarn, a sizing agent adhesion rate for the yarn.

[0002]

[Prior Art] A yarn sizing apparatus is so structured that a sizing roller and a squeeze roller are provided in a main sink containing a sizing agent, and the sizing agent in the main sink adheres to the yarn. Also included are an auxiliary sink to receive the sizing agent coming from an overflow section formed in the main sink, and a supply path with a pump to convey the sizing agent in the auxiliary sink to the main sink. With such a structure, the surface of the sizing agent in the auxiliary sink falls as the sizing agent in the main sink is reduced in amount due to adhesion to the yarn.

[0003] Further, the structure also includes a surface lower limit gage which produces an output when the surface of the sizing agent in the auxiliary sink reaches down to a predetermined lower limit position, and a surface upper limit gage which produces an output when the surface of the sizing agent in the auxiliary sink reaches up to a predetermined upper limit position. Thereby, the sizing agent is kept supplied to the auxiliary sink for the duration between outputs from the surface lower limit gage and the surface upper limit gage.

[0004] A gage for a sizing agent adhesion rate of the yarn measures, every time the auxiliary sink is provided with the sizing agent, the length of the yarn conveyed in a time period between outputs of the surface lower limit gage and the surface upper limit gage. Based on both the precalculated amount of the sizing agent between the upper and lower limit positions in the auxiliary sink, and the value as a result of yarn length measurement, the sizing agent adhesion rate of the yarn is calculated for output.

[0005]

[Problems that the Invention is to Solve] The issue here is that, once the yarn sizing apparatus starts its operation, the sizing roller and the squeeze roller both start rotation. Thereby, the sizing agent in the main sink is agitated, and thus the sizing agent adheres around the sizing roller and the squeeze roller both half immersed therein. As a result, the surface

of the sizing agent in the auxiliary sink rapidly falls because the sizing agent in the main sink is reduced in amount due to adhesion to the sizing roller and the squeeze roller. Similarly, when the yarn sizing apparatus stops its operation, the sizing roller and the squeeze roller both start showing reductions in rotation speed. Thereby, the sizing agent agitated around the sizing roller and the squeeze roller starts flowing into the main sink, causing the surface of the sizing agent to rapidly rise in the auxiliary sink. Consequently, as to the sizing agent adhesion rate of the yarn, a big difference is surely caused between the one measured when the yarn sizing apparatus has just started its operation and the one measured in an excessive state during the halting of the operation.

[0006] Moreover, when the yarn sizing apparatus is in operation, wave and bubble evolution on the surface of the sizing agent in the auxiliary sink, for example, may lead to unexpected malfunction of the surface upper limit gage and the surface lower limit gage. The adhesion rate measured in malfunction results in a non-negligible error.

[0007] If the operator sees a measurement value of the sizing agent adhesion rate having a non-negligible error, i.e., a measurement value largely different from a predetermined value, without knowing that the displayed measurement value has a non-negligible error, he or she so adjusts the yarn sizing apparatus as to correct the adhesion rate to the predetermined

value. As a result, the actual adhesion rate deviates to a greater degree from the predetermined value.

[0008] An object of the present invention is to solve such conventional problems as described above.

[0009]

[Means for Solving the Problems] According to the present invention, a method for measuring a sizing agent adhesion rate of a yarn in a yarn sizing apparatus in which a sizing agent in a main sink adheres to a yarn, and a surface of a sizing agent in an auxiliary sink falls as the sizing agent in the main sink adheres to the yarn and becomes less in amount, and in a time period after the surface of the sizing agent in the auxiliary sink falls down to a predetermined lower limit position and before rises up to a predetermined upper limit position, the auxiliary sink is supplied with the sizing agent, a measurement zone is set between the predetermined upper limit position and the predetermined lower limit position for the surface of the sizing agent in the auxiliary sink, and an amount of the sizing agent in the auxiliary sink reduced while the surface of the sizing agent in the auxiliary sink moves from a start point to an end point in the measurement zone is previously calculated, and a length of the yarn conveyed in a time period while the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone is measured, and based on the measurement value of the yarn length and the

previously calculated amount of the sizing agent, the adhesion rate of the yarn is calculated, characterized in that after the yarn sizing apparatus reaches a predetermined operation speed, after a moving speed of the surface of the sizing agent in the auxiliary sink is not in an excessive state any more, and before the yarn sizing apparatus starts showing speed reduction from the predetermined operation speed, a measurement value of the adhesion rate of he yarn is output only when the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone.

[0010] Further, in a method for measuring a sizing agent adhesion rate in the above yarn sizing apparatus, a measurement zone is set between the predetermined upper limit position and the predetermined lower limit position for the surface of the sizing agent in the auxiliary sink, and an amount of the sizing agent in the auxiliary sink reduced while the surface of the sizing agent in the auxiliary sink moves from a start point to an end point in the measurement zone is previously calculated, and a length of the yarn conveyed in a time period while the surface of the sizing agent in the auxiliary sink moves from the start point to the end point in the measurement zone is measured, and based on the measurement value of the yarn length and the previously calculated amount of the sizing agent, the adhesion rate of the yarn is calculated, characterized in that only when a measurement value of the adhesion rate of the yarn is larger

than a half of a concentration of the sizing agent but smaller than a value twice the concentration, the measurement value is output.

[0011]

[Effect] In the present invention, no measurement value of the adhesion rate of the yarn is displayed unless the yarn sizing apparatus reaches a predetermined operation speed, and a moving speed of the surface of the sizing agent in the auxiliary sink is not in the excessive state any more. Only before the yarn sizing apparatus starts showing speed reduction from the predetermined operation speed, the measurement value of the adhesion rate of the yarn is displayed.

[0012] Moreover, the measurement value of the adhesion rate of the yarn is not displayed unless the measurement result is larger than a half of the sizing agent concentration but smaller than twice the concentration.

[0013] Definition Equation of Sizing Agent Adhesion Rate of the Yarn

Adhesion Rate = Weight of Sizing/Weight of Yarn

Multiplying the right side thereof by "Weight of Sizing Agent" and then dividing by "Weight of Sizing Agent" leads to

Adhesion Rate = (Weight of Sizing Agent/Weight of Yarn) × (Weight of Sizing/Weight of Sizing Agent).

Weight of Sizing Agent/ weight of Yarn is a squeeze rate, and Weight of Sizing/Weight of Sizing Agent is a concentration. Thus,

the above equation becomes

Adhesion Rate = Squeeze Rate × Concentration.

[0014] The concentration, usually, hardly changes during yarn sizing. With the yarn sizing apparatus of a general type, the squeeze rate is within the range between 0.7 to 1.3. Accordingly, generally, the adhesion rate of the yarn is within a value range of 0.7 to 1.3 times the concentration. When the measurement value of the adhesion rate of the yarn is a half of the concentration of the sizing agent or smaller, or twice or more thereof, it means that the measurement value has a non-negligible error due to malfunction.

[0015]

[Advantage of the Invention] In the present invention, no measurement value of the adhesion rate of the yarn is displayed when the yarn sizing apparatus has just started its operation, and in an excessive state during the halting of the operation. Thanks thereto, no measurement value having a non-negligible error due to excessive state is displayed.

[0016] Further, no measurement value of the adhesion rate of the yarn is displayed when the measurement value of the adhesion rate of the yarn is a half or the sizing agent concentration or smaller, and when the value is twice or more of the concentration. Accordingly, no measurement value having a non-negligible error due to malfunction is displayed.

[0017] Therefore, with no measurement value having a

non-negligible error displayed, erroneous adjustment of the yarn sizing apparatus by the operator is successfully avoided.

[0018]

[Example] A yarn sizing apparatus in this example for executing a method to measure a sizing agent adhesion rate includes a beam creel section, a sizing section, a drying section, a dividing section, and a reel section, all of which are arranged in sequence.

[0019] The sizing section is, as shown in FIG. 1, provided with a main sink 1 for a sizing agent, and the main sink 1 is provided with a guiding roller 2, a sizing roller 3 which is half immersed in a sizing agent *s*, and a squeeze roller 4 structured by a roller half immersed in the sizing agent *s* and another roller arranged upstream thereof to be side by side. In such a structure, a yarn *y* coming from the guiding roller 2 goes into the sizing agent *s* beyond the sizing roller 3 in the main sink 1, and then goes through between the two rollers of the squeeze roller 4, thereby achieving sizing.

[0020] As shown in FIG. 1, the main sink 1 is formed with an overflow section 5 for keeping constant the surface height of the sizing agent. Lower to the overflow section 5 of the main sink 1, an auxiliary sink 6 is provided for the sizing agent, and a path 7 is so arranged as to receive the sizing agent *s* coming from the overflow section 5 of the main sink 1 and pass it to the auxiliary sink 6. A supply path 9 with a pump 8 is also provided for feeding the sizing agent *s* in the auxiliary

sink 6 to the main sink 1. With such a structure, the surface of the sizing agent in the auxiliary sink 6 falls as the sizing agent *s* in the main sink 1 adheres to the yarn *y* and thus becomes less in amount.

[0021] As shown in FIG. 1, the auxiliary sink 6 is provided with a surface lower limit gage 10 which produces an output when the surface of the sizing agent therein falls down to a lower limit position *a*, and a surface upper limit gage 11 which produces an output when the surface rises up to a predetermined upper limit position *b*.

[0022] As shown in FIG. 1, above the auxiliary sink 6, a storage sink 12 is placed for the sizing agent *s*. Therebetween, a feed path 14 with an opening and closing valve 13 is arranged for feeding the sizing agent *s* in the storage sink 12 to the auxiliary sink 6.

[0023] To the guiding roller 2 of the main sink 1, as shown in FIG. 1, a length measurement device 15 is provided for measuring the length of the yarn *y*.

[0024] Further, as shown in FIG. 1, a central processing unit 16 is provided. To an input end of the central processing unit 16, connected are the surface lower limit gage 10, the surface upper limit gage 11, and the length measurement device 15. Also connected are a low-speed operation switch 17, a high-speed operation switch 18, and an operation stop switch 19 of the yarn sizing apparatus, and an input device 20. To an output end of

the central processing unit 16, connected are the opening and closing valve 13 of the feed path 14, and a display unit 21.

[0025] For the duration between an output from the surface lower limit gage 10 and an output from the surface upper limit gage 11, the opening and closing valve 13 of the feed path 14 opens, and thus the sizing agent *s* in the storage sink 12 is supplied to the auxiliary sink 6.

[0026] In more detail, as shown in FIG. 2, every time the surface lower limit gage 10 produces an output responding to the falling of the surface of the sizing agent in the auxiliary sink 6 down to the lower limit position *a*, the opening and closing valve 13 of the feed path 14 opens. Then, once the sizing agent *s* clogged in the upstream of the opening and closing valve 13 of the feed path 14 starts flowing into the auxiliary sink 6 in the downstream of the opening and closing valve 13 of the feed path 14, the surface of the sizing agent in the auxiliary sink 6 stops falling and starts rising.

[0027] Further, as shown in FIG. 2, every time the surface upper limit gage 11 produces an output responding to the rising of the surface of the sizing agent in the auxiliary sink 6 up to the upper limit position *b*, the opening and closing valve 13 of the feed path 14 closes. The sizing agent *s* in the downstream of the opening and closing valve 13 of the feed path 14 responsively starts flowing into the auxiliary sink 6. Accordingly, the surface of the sizing agent in the auxiliary sink 6 rises above

the upper limit position b. Thereafter, when the amount of the sizing agent *s* flowing into the auxiliary sink 6 from downstream of the opening and closing valve 13 of the feed path 14 becomes less than the amount of the sizing agent *s* adhered to the yarn *y*, the surface of the sizing agent in the auxiliary sink 6 starts falling. Once the falling surface of the sizing agent in the auxiliary sink 6 reaches the upper limit position *b* or lower, the surface upper limit gage 11 stops producing an output.

[0028] In the method in this example for measuring the adhesion rate, as shown in FIG. 2, every time the surface upper limit gage 11 stops producing an output responding to the falling of the surface of the sizing agent in the auxiliary sink 6 reaching the upper limit position *b* or lower, the length measurement device 15 starts performing measurement. On the other hand, every time the surface lower limit gage 10 produces an output responding to the falling of the surface of the sizing agent in the auxiliary sink 6 down to the lower limit position *a*, the length measurement device 15 stops performing measurement.

[0029] That is, a measurement zone for the adhesion rate of the yarn *y* is so set as to be between the upper limit position *b* and the lower limit position *a*, through which the surface of the sizing agent in the auxiliary sink 6 falls. As to the amount of the sizing agent from the auxiliary sink 6 reducing while the surface of the sizing agent in the auxiliary sink 6 falls from the upper limit position *b* to the lower limit position *a*,

the value is calculated and input in advance from the input device 20 to the central processing unit 16.

[0030] Responding to every output from the surface lower limit gage 10, in the central processing unit 16, the adhesion rate of the yarn *y* is calculated. Used as the basis for the calculation are the length of the yarn *y* as a result of the measurement by the length measurement device 15, the amount of the sizing agent previously input from the input device 20, and the like. The resulting adhesion rate is output to the display unit 21 for display.

[0031] To start the operation of the yarn sizing apparatus which executes the method in this example for measuring the adhesion rate, a measurement start time *T* is first input from the input device 20 to a time unit in the central processing unit 16, the low-speed operation switch 17 is activated, and then the high-speed operation switch 18.

[0032] In response thereto, the time unit in the central processing unit 16 is activated, and also the sizing roller 3 and the squeeze roller 4 both start rotation. This agitates the sizing agent *s* in the main sink 1, and the agent adheres around the sizing roller 3 and the squeeze roller 4 both half immersed in the sizing agent *s*. Then, as shown in FIG. 2, the surface of the sizing agent in the auxiliary sink 6 rapidly falls for a predetermined period *k*. After the operation speed of the yarn sizing apparatus reaches the predetermined high-speed

operation speed, and after the moving speed of the surface of the sizing agent in the auxiliary sink 6 is not in the excessive state *k* any more, the measurement start time *T* elapses, and then the time unit of the central processing unit 16 produces an output.

[0033] After the time unit in the central processing unit 16 produces an output, when the falling surface of the sizing agent in the auxiliary sink 6 located at the start point *b* in the measurement zone reaches the end point *a* or lower, the length measurement device 15 is activated. Then, the adhesion rate of the yarn *y* is measured and displayed on the display unit 21. Before the output from the time unit in the central processing unit 16, the adhesion rate is not measured nor displayed.

[0034] To stop the high-speed operation of the yarn sizing apparatus or change the operation to the low-speed operation, the operation stop switch 19 or the low-speed operation switch 17 is activated.

[0035] In response, the sizing roller 3 and the squeeze roller 4 both start reducing in rotation speed, and thus the sizing agent *s* being agitated around these rollers 3 and 4 start flowing into the main sink 1, rapidly rising the surface of the sizing agent in the auxiliary sink 6. Here, if the operation stop switch 19 or the low-speed operation switch 17 is activated during the high-speed operation of the yarn sizing apparatus, this stops measurement and display of the adhesion rate thereafter. In a case where the length measurement device 15 is in operation

when the operation stop switch 19 or the low-speed operation switch 17 is activated, the length measurement device 15 stops its operation, and cancels the length so far measured.

[0036] Similarly, during the high-speed operation of the yarn sizing apparatus, in the central processing unit 16, every time the adhesion rate of the yarn y is calculated, the resulting measurement value is compared with the concentration of the sizing agent previously provided from the input device 20. If the calculated value is larger than a half of the concentration of the sizing agent, or smaller than a value twice the concentration, the value is displayed on the display unit 21. If the value is equal to or smaller than a half of the concentration of the sizing agent, or equal to or larger than the value twice the concentration, no measurement value is displayed on the display unit 21.

[0037] In this example, when the yarn sizing apparatus has just started its high-speed operation, and in an excessive state during the halting of the high-speed operation, no adhesion rate of the yarn is measured. Thanks thereto, no measurement value having a non-negligible error due to excessive state is displayed.

[0038] Further, when the measurement value of the adhesion rate of the yarn is a half of the sizing agent concentration or smaller, and when the value is twice or more of the concentration, no measurement value of he adhesion rate of the yarn is output.

Accordingly, no measurement value having a non-negligible error due to malfunction is displayed.

[Brief Description of the Drawings]

[FIG. 1] A schematic side view of a sizing section in a yarn sizing apparatus executing a method for measuring a sizing agent adhesion rate in an example of the present invention.

[FIG. 2] A diagram showing, in the method for measuring the sizing agent adhesion rate in the same example, an interrelation among an operation speed of the yarn sizing apparatus, a surface height of the sizing agent in an auxiliary sink, an output of a surface upper limit gage, an output of a surface lower limit gage, and ON/Off of a length measurement device, and their changes over time.

[Description of Reference Numerals and Signs]

1	main sink
6	auxiliary sink
15	length measurement device
16	central processing unit
a	lower limit position, end point of measurement zone
b	upper limit position, start point of measurement zone
s	sizing agent
y	yarn

TRANSLATION WITHIN FIG. 2

(From Above in Order)

HIGH-SPEED

OPERATION SPEED OF YARN SIZING APPARATUS

LOW-SPEED

STOP

SURFACE HEIGHT OF SIZING AGENT IN AUXILIARY SINK 6

OUTPUT FROM SURFACE UPPER LIMIT GAGE 11

OUTPUT FROM SURFACE LOWER LIMIT GAGE 10

ON/OFF OF LENGTH MEASUREMENT DEVICE 15